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RUWENZORI AND CENTRAL AFRICA.

- (1) *Il Ruwenzori: parte scientifica: risultati delle osservazioni e studi compiuti sul materiale raccolto dalla spedizione di S.A.R. il Principe Luigi Amedeo di Savoia, Duca degli Abruzzi.* Vol. i., Zoologia e Botanica. Pp. vii+603; 74 plates. Vol. ii., Geologia, Petrografia e Mineralogia. Pp. xxi+286; 40 plates. (Milan: Ulrico Hoepli, 1909.) Price, 2 vols, 50 lire.
- (2) *Résultats scientifiques des Voyages en Afrique d'Édouard Foà.* Publiés sous les Auspices du Muséum d'Histoire naturelle. Avec Préface de M. Edmond Perrier. Pp. xli+742. (Paris: Imprimerie Nationale, and Plon-Nourrit et Cie., 1908.)

(1) IN 1906 the Duke of the Abruzzi, already famous for his exploration of the lofty mountains of Alaska, resolved to do what no other traveller had done—make a thorough examination of the range of snow mountains in equatorial Africa known as “Ruwenzori.” The number of snow peaks, their altitudes, extent of glaciation, and exact position on the map remained still unknown, although Ruwenzori had been revealed to geographical knowledge for nearly twenty years. Although no previous explorers had had the monetary resources of this prince of the House of Savoy, and consequently been able to fit out such a perfectly organised expedition, yet it must be noted that most of the Duke’s predecessors suffered from sheer bad luck in the way of weather, or difficulties arising from the disturbed condition of the natives. Otherwise the Duke of the Abruzzi might have been forestalled as conqueror of these virgin peaks. But in any case it is doubtful whether any previous traveller was so perfectly trained to make every use of his opportunities as the Duke of the Abruzzi, who, apart from his carefully chosen staff, selected to deal specially with geology, biology, and photography, was himself a highly trained surveyor, scientific geographer, and alpinist.

The result has been, of course, a complete settlement of the position, height, configuration, and petrological structure of these “Mountains of the Moon”—not, as we now learn, the highest point on the African continent in that respect they are only third in rank—but surely the most impressive and remarkable among African mountains. The general geographical and meteorological results of the expedition were given in one large volume at the close of 1908 (published in English and Italian). In the two volumes under review, the geological and biological collections and observations of the Duke’s expedition are dealt with by a large number of authors, the whole work being edited by Dr. Alessandro Roccati (who has also written on the geology and petrology) and published in Italian only. The volumes are magnificently produced, and are of the highest importance scientifically. They deal justly, even generously, with the work of previous explorers, or with the opinions and researches of British, French, and German authorities (*inter alios*); but why did not Dr. Roccati get

some one to go carefully through the proof sheets with him before publication? The two volumes abound in the most ridiculous press errors, wherever the Latin, English, German, or French languages are employed. English is the worst maltreated. The English authors quoted are sometimes made to express themselves in a very puzzling manner.

Ruwenzori was shown by the Abruzzi expedition to be a mountain chain mainly of archæan, crystalline rocks (gneiss, mica-schists, granite, &c.), cut athwart by a curved band of Palæozoic volcanic greenstones (amphibolite, diorite, diabase, &c.). In the upper valleys of the Bujuku, Mubuku, Mahoma, and other streams, born from the snow peaks and the glaciers, there is a lacustrine alluvium (which ought to be interesting of exploration for possible Pliocene or Pleistocene fossils). There are two or three calcareous deposits. The lower stream valleys are bordered by ancient and recent moraines. At the southern base of the Portal Peaks (south-east of Ruwenzori) there are three small dykes of basalt. Elsewhere in the distant foothills to the east and south of Ruwenzori there are plain evidences of recent volcanic activity in the intrusions of basalt, the stratified tuff, the craters of dead volcanoes (often filled with lovely crater lakes), the hot springs and the frequent earthquakes. This volcanic belt links on with the still smoking and devastated region of Mfumbiro and Lake Kivu, and is no doubt synchronous in origin with the volcanic activities of equatorial East Africa and of North Nyasa.

The work under review has much that is interesting to record on the former extension of the Ruwenzori glaciers. The volumes confirm the observations of Scott-Elliott, Moore, the present writer, and other travellers as to the signs of glacier action at comparatively low altitudes (7000 feet and less). If these deductions be correct, similar signs ought to be present (and should be looked for) on the Abyssinian, North-Nyasa, Mlanje, Rhodesian, and Drakensberg Mountains. But if these indications of a Glacial period or periods are found in tropical Africa, and if, moreover, they are proved to be coincident in time with the Glacial periods of Europe and North America, will this not tend to dispose of the idea now in vogue that there has been a gradual shifting of the poles of the earth’s axis, carrying with it the more or less glacial conditions gathered round the poles to various parts of the earth’s surface? This last theory certainly explained more easily the former existence of a vegetation in both the present polar regions sufficiently dense to become transformed in course of time into coal-measures, a vegetation which could not have flourished with a six months’ winter-night in every year.

Dr. Roccati thinks that Ruwenzori was at one time a lofty island of archæan rocks rising up out of the waters of an immense fresh-water sea—the Victoria Nyanza, Ibrahim (or Kioga), Albert Nyanza, Albert Edward, Dweru, and Semliki combined. He attributes this idea in its inception to the studies of Mr. C. W. Hobley, a Commissioner in the British East African service who has done so much to increase our knowledge of Equatorial Africa.

The Duke of the Abruzzi established definitely the existence in the Ruwenzori range of six great *massifs* of snow-crowned, glaciated peaks. These are not placed in a continuous chain, but rather in a cluster, almost a broken amphitheatre, with Mts. Speke and Baker in the middle and the snowless Portal Peaks (11,000–12,000 feet) on the eastern side. It is from the south-east that the Ruwenzori giants are most broken down and most approachable. All the snow peaks are grouped within a few miles of one another, but beyond them, to the north, are lofty, snowless hummocks, perhaps rising to 9000 or 10,000 feet, which prolong the chain northwards in the direction of Lake Albert.

The loftiest of the snow-crowned *massifs* or mountains (Mt. Stanley) rises to 16,815 feet at its highest point (the Margherita Peak). The next highest *massif* is Mt. Speke (16,080 feet). After that Mt. Baker (15,988 feet), Mt. Emin (15,797 feet), Mt. Gessi (15,647 feet), and Mt. Luigi di Savoia (15,299 feet).

In possessing all these separate snow-crowned *massifs*, Ruwenzori differs from Kilimanjaro (with only two) and Kenya (only one), besides in the fact that its origin is due to a slow upheaval of the earth's crust, and not—as is the case with the other two great snow mountains of Africa, and their neighbours, Meru and Elgon—to an outburst of volcanic energy.

In the zoological collection made by the Duke was a fine specimen of a leopard obtained at Bujongolo (about 12,000 feet altitude), on the east side of Ruwenzori. It measured about 7 feet 2 inches in total length, and of this measurement the tail only occupied about 2 feet 3 inches. These are rather the proportions in tail and body of a jaguar than of a leopard. The markings, moreover, in the large size and completeness of the rosettes recall the jaguarine type, and still more the boldly marked leopards of Sinai, Persia, and China, and the Central Asian Ounce. The canine teeth in *Felis pardus ruwenzorii* are proportionately much longer than in other African leopards (except in one example from the Abyssinian Mountains). In this point (but not in skull peculiarities) the Ruwenzori leopard resembles the peculiar "*fontanieri*" leopard of China. Prof. Lorenzo Camerano, who describes *F. pardus ruwenzorii*, does not seem to be aware that Mr. Lydekker a year or so ago described a similar type from the Toro country at the north-east base of Ruwenzori. The present writer also saw a large leopard skin of this description in the possession of the Rev. Mr. Teggart (C.M.S.) in eastern Toro in June, 1900. This skin appears in the background of a seated man on p. 587 of the "Uganda Protectorate."

The second volume of "Il Ruwenzori" contains a good deal of interesting material on the subject of the Colobus monkeys (a group which seem to retain points of affinity with the Semnopithecines of Asia, the Archæolemurine forms of Madagascar, and even the Cebidæ of America); of Grant's zebra, and the classification of the "quagga" subgenus of equines; of the Central African buffaloes; and of the squirrels, dormice, mice, and crested rats (*Lophuromys*) of Ruwenzori. A few new birds are described, and numerous molluscs. A noteworthy contribution to "Il

Ruwenzori" is Prof. F. Silvestri's essay on the Myriapoda—the Diplopoda especially—obtained by the Abruzzi expedition.

A very large and important collection was also made of earthworms and of parasitic worms, the latter derived from the intestines of beasts, birds, and reptiles.

The botanical section of this work is also of high interest, as it illustrates very conclusively the alpine and subtropical flora of Ruwenzori—the giant groundsels, strange lobelias, the heaths, junipers, and ferns—filling up many gaps left in the work of previous travellers.

(2) Not equally valuable in the scientific study of Africa is the work so sumptuously produced by the Paris Museum of Natural History. The results of M. Edouard Foà's journeys, to have acquired proper significance and reward from the public interested in African geography and ethnology, should have been published ten years ago. His remarks would then have been more apposite; his discoveries would not have been forestalled by later and more scientific travellers. As it is, M. Foà was at no time what might be called a trained observer, except in regard to astronomical and meteorological observations and records. His ethnology and his natural history strike the critical reader as hazy, inexact, too generalised, too little founded on direct personal observation, too much influenced by traditional opinions. His vocabularies of native languages are full of errors, and are, moreover, quite displaced in interest by the serious treatment of these Zambezan Central African, and East Congo languages by a host of British, French, and Belgian missionaries and officials. Amongst inaccuracies, too (perhaps on the part of the editors), is the presentation of an obvious Bushman (pp. 142 and 143) as a Yao. [The origin of this mis-named picture is in the possession of the Royal Anthropological Institute.] Some of the notes on the Bushmen would be interesting and valuable were they not so devoid of actuality, of names, places, and dates. Apparently M. Foà did encounter some of the mysterious "Vaalpens" in the valley of the northern Limpopo (though he does not give them that name—see pp. 113, 114), a race the existence of which (as "pygmy" type distinct from the Bushman) has been asserted by Prof. Keane and denied by Mr. Selous. It is interesting to note that M. Foà comments on the complete absence of steatopygy among the northern Limpopo Bushmen (? Vaalpens), and the result of his description rather accords with what Prof. Keane has collected relative to the Vaalpens.

There are portions of M. Foà's essays on the lion and the African elephant which strike one as new and interesting, and derived from original observation; mixed up, however, with much unnecessary padding. He is able to supply two good photographs of the rare Angas's Tragelaph and some fresh information about that handsome creature. He discovered in Central Zambezia what is probably a new subspecies of Burchell's zebra (or, as Mr. R. I. Pocock would say, quagga), which seems in its narrow striping an intermediate form between the zebra and the quagga groups (see also on this subject "Il

Ruwenzori"). M. Foà made considerable collections of fish in Central Africa, of mollusca, insects, spiders, ticks, and crustaceans. He also brought back *Medusæ* from Tanganyika. These *Medusæ* serve as a text for a very interesting article by M. Charles Gravier on the *Medusæ* of the Victoria Nyanza, of Tanganyika, and of the Niger basin. Perhaps the most important contribution to this *recueil* is the treatise by M. Louis Germain on the molluscs of Tanganyika, notably those collected by M. Foà. M. Foà's own remarks on the tsetse fly are worthy of attention.

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THE PLANET MARS, 1890-1901.

La Planète Mars et ses Conditions d'Habitabilité. By Camille Flammarion. Tome ii., Observations faites de 1890 à 1901. Pp. 604. (Paris: Gauthier Villars, 1909.) Price 12 francs.

IN the year 1893 we had the great pleasure of giving our readers some account (vol. xlvii., p. 553) of the very excellent and complete summary of the observations of the planet Mars, made between the epochs 1636-1890, compiled by the distinguished French astronomer, Monsieur Camille Flammarion. This work, containing no fewer than 604 pages, presented us with a most interesting survey of the progress made in enumerating and deciphering the markings observed on the planet's surface. It commenced with the earliest known observation of the planet, namely, that of the Neapolitan astronomer Fontana, on August 24, 1638, who wrote:—

"1636. Martis figura perfecte spherica distincte atque clare conspiciebatur. Item in medio atrum habebat conum instar nigerrimæ pilulæ.

"Martis circulus discolor, sed in concava parte ignitus deprehendebatur.

"Sole excepto, reliquis aliis planetis, semper Mars candentior demonstratur."

The volume concluded with the observations made in the year 1890, including the first photographs of the disc of Mars made by Prof. W. H. Pickering at Mount Wilson, California, on April 9.

In Martian cartography the year 1890 seems to-day a very long time ago. The pioneers did their work well, and the great tradition which fell on the shoulders of those who were busy with Mars up to 1890 was well maintained, and a great amount of new knowledge secured. Since that year the attack on the planet, to unravel the secrets of its visible features, has been no less severe, and to-day the knowledge gained is only a new incentive to further research.

If we were to be asked to state three or four of the more recent and most important discoveries in relation to the planet Mars, we should be inclined to say as follows:—

(1) That the dark areas on the planet which were considered to be seas have been shown to be traversed by permanent lines, and that, therefore, the water surface explanation had to be abandoned (Pickering and Douglas, 1892).

(2) The successive development of the canals according to the Martian seasons (Lowell).

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(3) The photography of the canals themselves (Lampland, 1903-5).

(4) The photography of the spectrum of water vapour in the Martian atmosphere (Slipher, 1908).

While the above may be considered as four of the important results secured since 1890, there is a host of many other valuable advances which will be found recorded in the volume under review.

Monsieur Flammarion has done his work exceedingly well, and, with masterly instinct, describes, fits together, and discusses the observations, made between the years 1890 and 1901 by a very great number of workers, in a logical and interesting manner.

Before commencing to give in detail the observations of the first epoch, 1892, he rightly refers at some length to the fine memoir published in 1896 by the celebrated Italian astronomer, M. Schiaparelli, the discoverer of the canals. This memoir is devoted to a discussion of his observations of the Opposition 1883-4, while a sixth memoir, published in 1899 and here referred to, contains his observations made at the Opposition of 1888.

Space does not allow us, nor indeed is it necessary, to enter into any detail into the successive series of observations which are here marshalled together. The reader must be left to peruse the volume himself and form his own conclusions, but even he will be astonished at the wealth of matter which is brought together under one cover.

As in the previous work, there is a great number of illustrations accompanying the text, and these add materially to the understanding of the changes of Martian features.

At the end of the volume, M. Flammarion, with the help of M. Antoniadi, has constructed a key-map of the surface features of the planet, which gives us an idea of the complicated system of markings which is the result of the observations up to the year 1901.

As has been mentioned above, some important additions to our knowledge of Mars have resulted from observations of more recent date, and we can only suppose that M. Flammarion has in hand vol. iii., which will, we hope, in due course be published, and be as valuable a contribution to astronomical science as its two predecessors.

In conclusion, we may quote M. Flammarion's remarks with regard to the habitability of Mars, since the subject has recently been prominently brought forward:—

"Mais il me semble que, dans toutes ces interprétations, je suis moi-même un peu terrestre. Il y a sans doute là d'autres éléments, non terrestres, mais martiens, ou, tout au moins, des conditions toutes différentes de celles de notre habitation. Que cette planète soit actuellement le siège de la vie, c'est ce dont témoignent toutes les observations. Mais il nous est encore impossible de nous former aucune idée judicieuse sur les formes que cette vie a pu revêtir, formes assurément différentes de nôtres. Un mystère impénétrable enveloppe encore aujourd'hui ce passionnant problème, qui est, en définitive, quoi qu'on en passe, le but, peut-être inaccessible, de toutes les recherches de l'Astronomie planétaire. Mais ne désespérons jamais! Qui sait ce qui sommeille dans l'inconnu de l'avenir?"

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